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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/084,873	03/01/2002	Quinn K. Tong	1987.EEM	7243

7590 12/23/2004

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EXAMINER

ZARNEKE, DAVID A

ART UNIT PAPER NUMBER

2829

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/084,873

Applicant(s)

TONG ET AL.

Examiner

David A. Zarneke

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 October 2004.
- 2a) ☒ This action is **FINAL**.      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-22 and 24-39 is/are pending in the application.
- 4a) Of the above claim(s) 33-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-22,24-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments filed 10/12/04 have been fully considered but they are not persuasive.

First, it is argued that the phenol curing agent of Kunitomo would not reasonable work in the acid anhydride/carboxylic acid flux/hardener added encapsulant of Gilleo because acids can prematurely cure phenolics, which is counter to the present invention's delayed curing.

The examiner asserts that claims 3, 4, 12, 24 and 25 all either require acids or list acids as possible acceptable materials. If acids are so contrary to the teaching of the present invention, why are they included as possible acceptable materials for required components of the present invention? Especially when Kunitomo and Gilleo list these acceptable materials.

It is also argued that Kobayashi teaches the use of a cure accelerator and therefore would not work in the present invention's teaching of a delayed cure.

The examiner asserts that this argument is a piecemeal analysis of the rejection, picking and choosing between the two references without considering how they were combined in the rejection. Kobayashi was used only to teach the conventionality of the epoxy materials required in the claims.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208

Art Unit: 2829

USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gilleo et al., US Patent 6,194,788, in view of Kunitomo, JP 58103525.

Gilleo teaches a B-stage-able underfill encapsulant (7, 54+) comprising:

- a) thermal curable resin system comprising an admixture of at least one epoxy, one preferably being biphenyl A (4, 7+);
- b) a hardener such as acid anhydrides (4, 12+);
- c) at least one solvent (4, 40+);
- d) at least one inorganic filler (4, 23+); and
- e) at least one fluxing agent (4, 18+),

wherein the encapsulant solidifies during the B-stage process to produce a smooth, non-tacky surface on a semiconductor wafer (4, 3+) or silicon chip.

The B-stage encapsulant of Gilleo inherently produces a smooth, non-tacky surface because Applicant's own specification states that B-stage means that the

underfill must be solidified after its placement on a wafer to provide a smooth, non-tacky coating (page 3, last line and page 4, top).

Gilleo fails to teach the use of an imidazole-anhydride adduct as the hardener.

Kunitomo teaches an epoxy resin composition (abstract) comprising an epoxy resin; a phenol containing compound, namely a phenol novolak resin; a 2-methylimidazole/pyromellitic anhydride complex curing agent; and an inorganic filler (page 233, 2<sup>nd</sup> column, 4<sup>th</sup> to last line).

It would have been obvious to one of ordinary skill in the art to use the curing promoting agent of Kunitomo in the invention of Gilleo because Kunitomo teaches that the anhydride-imidazole complex provides long-term storage stability.

Claims 3-22 and 24-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gilleo et al., US Patent 6,194,788, in view of Kunitomo, JP 58103525 as applied to claim 1 above, and further in view of Kobayashi et al., JP 62-081416A.

Kobayashi teaches an epoxy composition for sealing a semiconductor comprising an epoxy resin, a phenol type curing agent and a curing promoting agent.

It would have been obvious to one of ordinary skill in the art to use the composition of Kobayashi in the invention of Gilleo and Kunitomo because Kobayashi is relied upon to teach the conventionality of the components.

The use of conventional materials to perform their known functions in a conventional process is obvious. In re Raner 134 USPQ 343 (CCPA 1962).

Regarding claim 3, Kobayashi teaches an epoxy and a phenol, wherein the epoxy can comprise an aliphatic epoxy (3, 4<sup>th</sup> to last paragraph).

With respect to claim 4, Kobayashi teaches an epoxy novolak resin (3, 4<sup>th</sup> to last paragraph).

As to claims 5 and 6, Gilleo teaches the use of bisphenol A (4, 7+).

Regarding claims 7-11, it would have been obvious to one of ordinary skill in the art to optimize the percentage of epoxy and phenol in the epoxy/phenol admixture, and the percentage of the admixture in the whole encapsulant (MPEP 2144.05(b)).

With respect to claim 12, Kobayashi teaches the use of a triphenylphosphine and it would have been obvious to one of ordinary skill in the art to optimize the anhydride used (MPEP 2144.05(b)).

As to claim 13, it would have been obvious to one of ordinary skill in the art to optimize the imidazole-anhydride adduct used (MPEP 2144.05(b)).

Regarding claims 14 and 15, it would have been obvious to one of ordinary skill in the art to optimize the percentage of the imidazole-anhydride adduct in the encapsulant (MPEP 2144.05(b)).

With respect to claims 16-18, considering Gilleo teaches the use solvents or solvent blends that are comparable to the components selected (4, 40+), it would have been obvious to one of ordinary skill in the art to optimize the solvent selected (MPEP 2144.05(b)).

As to claim 19, it would have been obvious to one of ordinary skill in the art to optimize the percentage of solvent in the encapsulant (MPEP 2144.05(b)).

Regarding claims 20 and 21, Gilleo teaches the use of silica filler (8, 12).

With respect to claim 22, it would have been obvious to one of ordinary skill in the art to optimize the percentage of filler in the encapsulant (MPEP 2144.05(b)).

Regarding claims 24 and 25, it would have been obvious to one of ordinary skill in the art to optimize the flux used (MPEP 2144.05(b)).

With respect to claims 26 and 27, it would have been obvious to one of ordinary skill in the art to optimize the percentage of flux in the encapsulant (MPEP 2144.05(b)).

As to claim 28, Gilleo teaches the use of wetting agents, cross-linking agents and polymerization catalysts (4, 18+).

Regarding claims 29 and 30, it would have been obvious to one of ordinary skill in the art to optimize the surfactant and diluent used (MPEP 2144.05(b)).

With respect to claim 31, the B-stage processing of the encapsulant before dicing the wafer into chips is conventionally known in the art.

The use of conventional materials to perform there known functions in a conventional process is obvious. In re Raner 134 USPQ 343 (CCPA 1962).

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gilleo et al., US Patent 6,194,788, in view of Kunitomo, JP 58103525.

Gilleo teaches a wafer having B-stageable underfill composition deposited on one face of the wafer, the B-stageable composition comprising:

- a) thermal curable resin system comprising an admixture of at least one epoxy, one preferably being biphenyl A (4, 7+);
- b) a hardener such as acid anhydrides (4, 12+);
- c) at least one solvent (4, 40+);

d) at least one inorganic filler (4, 23+); and

e) at least one fluxing agent (4, 18+).

Gilleo fails to teach the use of an imidazole-anhydride adduct.

Kunitomo teaches an epoxy resin composition (abstract) comprising an epoxy resin; a phenol containing compound, namely a phenol novolak resin; a 2-methylimidazole/pyromellitic anhydride complex curing agent; and an inorganic filler (page 233, 2<sup>nd</sup> column, 4<sup>th</sup> to last line).

It would have been obvious to one of ordinary skill in the art to use the curing promoting agent of Kunitomo in the invention of Gilleo because Kunitomo teaches that the anhydride-imidazole complex provides long-term storage stability.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

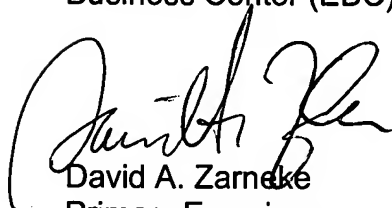
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (571)-272-1937. The examiner can normally be reached on M-F 7:30 AM-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Tokar can be reached on (571)-272-1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David A. Zarneke  
Primary Examiner  
December 21, 2004